Appl. No. 10/687,943
Amdt. Dated 14 July 2006
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AMENDMENTS TO THE CLAIMS

Please substitute the following claims for the respective claims previously existing in this application.

1. (Previously presented) A fuel cell, comprising:

a membrane electrode assembly, wherein the membrane electrode assembly comprises:

an anode,

a cathode, and

an electrolyte disposed between and in intimate contact with the anode and the cathode; and

a layer of porous gas diffusion material disposed on a first surface of the membrane electrode assembly, wherein the layer of porous gas diffusion material is electrically conductive and is in thermal contact with the first surface of the membrane electrode assembly;

wherein porosity of the porous gas diffusion material at localized areas on the porous gas diffusion layer decreases from a first value to a second value in response to a decrease in temperature at corresponding areas on the membrane electrode assembly adjacent to the porous gas diffusion layer.

2. (Cancelled)

3. (Previously presented) The fuel cell as described in claim 1, further comprising a current collector, wherein the porous gas diffusion layer is interposed between the current collector and the membrane electrode assembly.

4. (Original) The fuel cell as described in claim 1, wherein the porous gas diffusion material further comprises a layer made of electrically conductive materials distributed such that the resulting layer is micro or nano porous.

5. (Original) The fuel cell as described in claim 4, wherein the electrically conductive materials is a combination of one or more elements selected from the group consisting of metal fibers exhibiting positive coefficient of thermal expansion, polymer fibers exhibiting positive coefficient of thermal expansion, thermoresponsive polymers exhibiting positive swelling in gel form, thermoresponsive polymers exhibiting positive swelling in fibrous form, thermoresponsive polymers exhibiting negative swelling in gel form and thermoresponsive polymers exhibiting negative swelling in fibrous form.

6. (Original) The fuel cell as described in claim 1, wherein the porous gas diffusion material further comprises:

a core layer made of materials distributed such that the resulting layer is micro or nano porous; and

a conductive material disposed over or embedded in the core layer such that the resulting layer is electrically conductive.

7. (Original) The fuel cell as described in claim 6, wherein the core layer material is a combination of one or more elements selected from the group consisting of metal fibers exhibiting positive coefficient of thermal expansion, polymer fibers exhibiting positive coefficient of thermal expansion, thermoresponsive polymers exhibiting positive swelling in gel form, thermoresponsive polymers exhibiting positive swelling in fibrous form, thermoresponsive polymers exhibiting negative swelling in gel form and thermoresponsive polymers exhibiting negative swelling in fibrous form.

8. (Previously presented) The fuel cell as described in claim 1, further comprising a current collector interposed between the porous gas diffusion layer and the membrane electrode assembly.

9. (Original) The fuel cell as described in claim 1, wherein porosity of the porous gas diffusion material at localized areas on the porous gas diffusion layer further decreases from the first value to the second value in response to a trigger condition at corresponding areas on the membrane electrode assembly adjacent to the porous gas diffusion layer,

wherein the trigger condition is created in response to a combination of one or more elements selected from the group consisting of temperature, pH, hydrogen concentration, electrolyte water content, electrolyte thickness, electrolyte ionic conductivity and electrolyte electronic conductivity of the membrane electrode assembly adjacent to the porous gas diffusion layer, crossing a threshold value.

10-19. (Cancelled)